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BY EMAIL TRANSMISSION:

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Reference: **Comments of Environmental Defense Fund on Proposed CO2 Budget Trading Program [9 VAC 5 - 140]**

Dear Ms. Sabasteanski,

Environmental Defense Fund (EDF) respectfully submits the following comments in response to the January 8, 2018 publication of the proposed CO2 Budget Trading Program [9 VAC 5-140 (Regulation for Emissions Trading Programs)] in the *Virginia Register of Regulations*.[1]

EDF supports Virginia finalizing a regulation to reduce carbon pollution from the electric power sector, covering both new and existing sources, in order to mitigate the effects of climate change and grow the clean energy economy in Virginia.

Our comments address the following issues:

1. Virginia has clear legal authority to move forward with a program to reduce carbon emissions from the power sector.
2. Virginia has profound public health and climate benefits at stake.
3. Virginia can unleash clean energy and slash carbon pollution from the power sector.
4. Virginians strongly support aggressive climate action.
5. EDF strongly supports Virginia finalizing a regulation to reduce carbon pollution from the electric power sector, covering both new and existing sources, in order to mitigate the effects of climate change and grow the clean energy economy in Virginia.
6. DEQ should set an emissions budget that starts in 2020 at *no higher* than 30 million tons and declines annually by *at least* 3% of the 2020 budget – and should seriously consider a budget that starts even lower and declines more stringently over time, particularly as new

[1] Cite 34:10 VA.R. 924-959, *available at* http://register.dls.virginia.gov/vol34/iss10/v34i10.pdf.

information and analysis becomes available about Virginia emissions. DEQ should also evaluate adjustment approaches to ensure the budget is properly calibrated.

7. Virginia should link and align the CO2 Budget Trading Program with the Regional Greenhouse Gas Initiative, in order to facilitate cost-effective emission reductions.
8. EDF supports the use of a consignment auction with updating output-based allocation to covered sources.
9. DEQ should expand the program to cover industrial power plants over 25 MW in Virginia.
10. Virginia should take steps to ensure environmental justice concerns are met in the final rule and throughout implementation.

Respectfully submitted,

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1. Virginia has clear legal authority to move forward with a program to reduce carbon emissions from the power sector.

A. The Virginia Air Pollution Control Board Has Clear Existing Authority to Regulate Greenhouse Gases Emissions through a Statewide Cap

The Virginia State Air Pollution Control Board (the "APCB" or the "Board") has clear existing legal authority to regulate carbon dioxide ("CO_2") pollution from the power sector through pollution-reducing regulations, including through the implementation of a statewide cap and emissions trading. The APCB is broadly empowered to develop comprehensive programs for the "abatement[] and control of all sources of air pollution in the Commonwealth"[2] including through the promulgation of regulations "abating, controlling and prohibiting air pollution throughout or in any part of the Commonwealth . . . ."[3] This includes the authority to craft regulations to reduce greenhouse gases, pollutants which fall squarely within the state's existing definition of "air pollution" as "the presence in the outdoor atmosphere of one or more substances which are or may be harmful or injurious to human health, welfare, or safety, to animal or plant life, or to property, or which unreasonably interfere with the enjoyment by the people of life or property."[4] Given the APCB's broad authority to address air pollution, the Virginia Attorney General determined that because the "overwhelming body of scientific literature demonstrates a growing consensus among scientists studying carbon dioxide that it contributes to elevated global temperatures and may be harmful to the welfare of people, animals, and property" the APCB has ample existing "legal authority to regulate greenhouse gas emissions . . . via a 'statewide cap' on emissions or through other means."[5] This is consistent with the APCB's prior determination that its broad existing authority and mandate to abate air pollution encompasses the authority to regulate greenhouse gases.[6]

The APCB is charged with taking all actions "reasonably necessary to carry out" its broad mandate to abate and control air pollution, "including the achievement and maintenance of such levels of air quality as will protect human health, welfare and safety and to the greatest degree practicable."[7] The APCB is broadly empowered to issue permits and enforce permit conditions to achieve this mandate.[8] A non-market based regulation for greenhouse gas emissions could impose specific emission reduction obligations on regulated sources as permit

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[2] Va. Code Ann. § 10.1-1307(A).
[3] Va. Code Ann. §10.1-1308(A).
[4] Va. Code Ann. §10.1-1300 (Supp. 2016). The identical definition was adopted in the Board's regulations. *See* 9 Va. Admin. Code § 5-10-20.
[5] Opinion of Mark R. Herring, Attorney General of the State of Virginia, 2017 Va. AG LEXIS 16, No. 17-010 (May 12, 2017) ("Thus, I conclude that GHGs, including carbon emissions, are air pollution by definition and can be regulated by the Board.")
[6] For example, the Board has previously prepared regulations to permit greenhouse gasses pursuant to EPA's PSD program under the Tailoring Rule. *See* 9 VAC § 5-85-70.
[7] Va. Code Ann. §10.1-1306.
[8] Va. Code Ann. § 10.1-1322. Permits.

conditions. A cap and trade program for greenhouse gases would require each regulated source, as a permit condition, to hold sufficient allowances to match its emissions. Because the cap would be equal to the allowances in circulation, overall emissions would fall to the level of the cap. Because allowances can be traded between regulated sources, sources with the most cost-effective abatement opportunities will reduce their emissions and sell allowances to other sources, maximizing the cost-effectiveness of the emission reductions. By using the allowance trading market to find the lowest cost emission reduction opportunities, the cap and trade program provides regulated sources with more flexibility and secures the same emission reductions at lower-cost than the analogous regulatory approach that would impose specific emission reduction obligations on each source through permit conditions. APCB's authority to promulgate regulations to control air pollution to protect human health, welfare, and safety and to impose conditions on emission sources through enforceable permits is broad and easily encompasses a greenhouse gas abatement regulation structured as a cap and trade program.

B. APCB's Statutory Authority Provides Ample Support for the Adoption of a Trading Program

There is nothing within the APCB's expansive authority to control harmful air pollution that would exclude trading frameworks from allowable regulatory approaches where the pollutant in question does not have localized impacts based on where it is emitted. The APCB's general rulemaking authority to develop regulations to abate air pollution, coupled with its broad enforcement authority to take all actions "reasonably necessary to carry out" its broad mandate to abate and control air pollution, give the board ample authority to develop and enforce regulatory programs as it sees fit, including providing for emissions trading.[9]

The APCB has implemented a number of other regulatory programs that contain trading elements[10] and, in doing so, APCB has relied on its general authority to abate and control air pollution, §10.1-1308. For example, even in instances where the Virginia General Assembly has passed additional legislation to prescribe particularly program elements for previous trading programs,[11] such as the provisions allowing interstate trading under the National Ambient Air Quality Standards Program, the legislature cited the Board's broad, existing legal authority as a basis for developing regulations implementing trading programs. The legislature's acknowledgement and invocation of APCB's general regulatory power to facilitate the NOx trading provision under the National Ambient Air Quality Standards program further indicates that establishing such a program is firmly consistent with the APCB's broad authority to control air pollution and to take actions reasonably necessary to achieve adequate air quality.

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[9] Va. Code Ann. §10.1-1306.

[10] Programs to implement EPA's Clean Air Mercury Rule (CAMR), Clean Air Interstate Rule (CAIR) and NOx SIP call each relied on trading elements.

[11] *See e.g.*, 25:12 VA.R. 2106-2133 (Feb. 16, 2009). APCB regulations establishing Virginia's CAIR program cite both the APCB's general regulatory power, Va. Code Ann. §10.1-1308, and the legislature's specific trading as the statutory authority for the rulemaking.

C. APCB Has Existing Authority to Conduct a Revenue-Neutral Consignment Auction

The APCB's existing authority likewise encompasses the power to devise and implement a revenue-neutral allocation of allowances through a consignment auction, which would facilitate the distribution of allowances and provide price discovery and liquidity through the auction, supporting the functionality of the allowance trading market and the program as a whole. The Board is empowered to "consult, and cooperate with . . . all agencies of the Commonwealth, political subdivisions, private industries, and any other affected groups in furtherance of this chapter."[12] This provision authorizes the Board to coordinate with outside entities that could, if desired, administer the consignment auction. Permit conditions for specific sources could include the requirement that allocated allowances be consigned to the auction.

We support the proposal's consignment auction approach. A consignment auction captures the benefits and transparent allocation structure of an allowance auction.[13] Recognizing that "[c]onsignment auctions are revenue neutral, and will enable Virginia to link to RGGI"[14] the current proposal would structure the consignment auction in this way "with updating output-based allocation . . . as the mechanism for distributing and utilizing allowances."[15] We agree that this proposed approach promotes long-term, cost-effective strategies to reduce greenhouse gas emissions.

D. APCB's Existing Statutory Authority Supports Linking With RGGI and Other Existing Interstate Greenhouse Gas Programs

The APCB has clear existing authority to engage with third-party providers and collaborate with other states to reduce pollution. First and foremost, linkage with a broader greenhouse gas mitigation program would more efficiently fulfill the APCB's statutory purpose—abating air pollution that harms human health, welfare, or safety. Linkage with RGGI would enhance the effectiveness of Virginia's regulatory framework.

Further, as previously discussed, the APCB is authorized to "advise, consult, and cooperate with agencies of the United States and all agencies of the Commonwealth, political subdivisions, private industries, and any other affected groups in furtherance of this chapter."[16] The APCB's authority to cooperate with political subdivisions and private industries would

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[12] Va. Code Ann. § 10.1-1307.

[13] *See* Dallas Burtraw & Kristen McCormack, *Consignment Auctions of Free Emissions Allowances under EPA's Clean Power Plan,* Resources for the Future (June, 2016) *available at* http://www.rff.org/files/document/file/RFF-DP-16-20.pdf ("A consignment auction does not raise revenue, but it captures many of the other advantages that are associated with using auctions to initially distribute emissions allowances.")

[14] *Id.*

[15] Proposed Regulation Agency Background Document *available at* http://www.townhall.virginia.gov/L/GetFile.cfm?File=C:\TownHall\docroot\1\4818\8130\AgencyStatement_DEQ_8130_v1.pdf

[16] Va. Code Ann. § 10.1-1307.

enable APCB to partner with RGGI and its administrator to administer a consignment auction, as described above. The Virginia legislature has plainly acknowledged that the APCB has the authority to work with other states to facilitate emissions trading—the statute directing APCB to adopt certain program elements in its NOx trading program encourages the APCB to consider "but not be limited to, the inclusion of provisions concerning . . . interstate or regional emissions trading."[17]

The APCB also has authority to accept compliance instruments issued by another state and to allow compliance instruments originating in Virginia to be used out of state. Prior emission credit trading regimes have allowed regulated sources to submit compliance instruments linked to reductions out of state and allowances issued out of state. For example, CAMR regulations allowed Virginia sources to comply with regulatory obligations by reducing emissions at facilities located outside of Virginia's border.[18] Likewise, Virginia's CAIR regulations allowed covered sources in attainment areas to participate in interstate trading to the full extent allowed by EPA's CAIR regulations.[19]

E. The Virginia APCB Has Existing Authority to Allocate Allowances to Nonregulated Entities for "Set-Aside" Program.

In some circumstances, allocating allowances to entities that are not regulated sources can enhance the program's ability to secure emission reductions, or lower the costs of doing so. Virginia APCB's authority is sufficiently broad to encompass the allocation of allowances to entities that are not regulated sources and to "set aside" allowances for purposes that are related to the Board's mission to control air pollution.

The Board is broadly charged with crafting all rules "abating, controlling and prohibiting air pollution throughout or in any part of the Commonwealth [of Virginia]. . . ."[20] Acting under this mandate the APCB may take all actions "reasonably necessary to carry out" its mission to abate and control air pollution, "including the achievement and maintenance of such levels of air quality as will protect human health, welfare and safety and to the greatest degree practicable."[21] APCB is also authorized to "advise, consult, and cooperate with . . . all agencies of the Commonwealth, political subdivisions, private industries, and any other affected groups in

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[17] Va. Code Ann. § 10.1-1322
[18] Va. Code Ann. § 10.1-1328 (repealed).
[19] Va. Code Ann. § 10.1-1327 (repealed). The CAIR regulations allowed the APCB to prohibit electric generating facilities located within a nonattainment areas in Virginia from meeting their nitrogen oxide and sulfur dioxide compliance obligations through the purchase of allowances from in-state or out-of-state facilities. These regulations were vacated in part because of these restrictions on interstate trading. *See Mirant Potomac River, LLC v. Commonwealth*, No. 2067-08-2, 2009 Va. App. LEXIS 287, at *1 (Ct. App. June 23, 2009).
[20] Va. Code Ann. §10.1-1308.
[21] Va. Code Ann. §10.1-1306.

furtherance of this chapter."[22] Together, these provisions authorize the agency to set-aside allowances to fund programs "in furtherance" of APCB's mission of abating air pollution, or any other measures "reasonably necessary" to achieve that mission or any other purposes of the Act. As such, the APCB's authority includes the power to allocate allowances to nonregulated entities, including other state agencies like the Department of Mines Minerals and Energy ("DMME"), for the purposes of crafting programs related to the purposes reflected in Act, including air pollution control. The proposed regulation's set-aside of allowances to DMME to "assist the department for the abatement and control of air pollution" fit well within the Board's authority under its enabling act.[23] Prior regulatory efforts have also included provisions with allowance allocations to be set aside for similar programs, further reinforcing the fact that this approach fits within APCB's statutory authority.[24]

2. <u>Virginia has profound public health and climate benefits at stake.</u>

By taking strong action to abate carbon pollution from the power sector to mitigate climate change and reduce pollution, Virginia can realize a number of important benefits to public health, the environment, and Virginia families and communities.

Climate change is already affecting many aspects of life in Virginia. Hurricanes and other tropical storms cause immense amounts of damage — and their frequency will only increase as temperatures rise[25]. For instance, 2017's Hurricane Harvey displaced 620 Virginians and caused an estimated $13.2 million in damages in Virginia[26]. A study by the College of William & Mary estimated that more severe storms could cause up to $100 million in damages by 2040.[27] Flooding caused by sea level rise will also severely impact Virginia communities and destroy

[22] Va. Code Ann. § 10.1-1307; *See also*, Va. Code Ann. § 10.1-1186 (authorizing DEQ to "accept and administer services, property, gifts and other funds donated to the Department" and to "administer, under the direction of the Boards, funds appropriated to it for environmental programs and make contracts related thereto.").
[23] The proposed regulations state that, "The department will allocate 5.0% of the Virginia CO2 Budget Trading Program base budget to DMME to be consigned to auction by DMME to assist the department for the abatement and control of air pollution, specifically, CO2." Article 5, 9VAC5-140-6210 (proposed regulation).
[24] For example, in implementing CAIR, the APCB adopted EPA's Sulfur Dioxide Allowance System, 40 C.F.R. pt. 73, without amendment, including Subpart F - Energy Conservation and Renewable Energy Reserve, which set up an allowance reserve program aimed at funding conservation and renewable energy programs. While these CAIR regulations were adopted through incorporation by reference, their inclusion supports the notion that allowance set-asides have previously been found to be a viable option for achieving APCB's mission of controlling air pollution.
[25] Spanger-Siegfried, Erika *et al.*, "When Rising Seas Hit Home: Hard Choices ahead for Hundreds of U.S. Coastal Communities," Union of Concerned Scientists, Jul. 2017, available at https://www.ucsusa.org/sites/default/files/attach/2017/07/when-rising-seas-hit-home-full-report.pdf
[26] van Houtven, George *et al*., "Costs of Doing Nothing: Economic Consequences of Not Adapting to Sea Level Rise in the Hampton Roads Region," Virginia Coastal Policy Center, College of William and Mary Law School, Nov. 2016, available at https://law.wm.edu/news/stories/2016/documents/Summary%20Costs%20of%20Doing%20Nothing%20and%20Final%20Hampton%20Roads%20SLR%20Report.pdf
[27] Ibid.

property. Severe flooding in Norfolk and Virginia Beach has already become commonplace, with Naval Station Norfolk having to undergo significant renovations simply to stay operational in the face of the sea level rise that has already been observed.[28] Higher temperatures can also harm crop growth. As temperatures increase, the Virginian agricultural industry, which employs over 357,000 people and generates $55 billion in output[29], may be further adversely impacted. If carbon pollution continues unabated, the effects of resulting climate change will become increasingly profound.

Moreover, power sector emissions also compromise the health and lives of many Virginians. Particulate matter from the burning of coal has been linked with increased prevalence of bronchitis, asthma, and lung cancer. In one case, hospital intakes for respiratory distress declined by 50% in a single year after nearby polluting facility dramatically reduced emissions.[30] For residents of zip codes containing at least one fuel-fired power plant (coal, oil, natural gas, landfill gas, and solid waste), one study found an 11% increase in hospitalizations for asthma; 15% increase in hospitalizations for acute respiratory infection; and 17% increase in hospitalizations for chronic obstructive pulmonary disease.[31]

Continued exposure only worsens those conditions. Nearly 7% of Virginia's children and 8% of adults are estimated to have asthma.[32] Though asthma is generally treatable, it can still be deadly. In 2009, one American child died of an asthma attack every two days.[33] Asthma costs the United States $56 billion each year, with the average yearly cost of care for a child with asthma at $1,039 in 2009.[34] In Virginia, asthma-related hospitalizations cost $156 million in 2014.[35] In addition, the burden of pollution from emitting sources tends to have disproportionate impacts on disadvantaged communities, including communities of color and low-income families.

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[28] Kusnetz, Nicholas, "Rising Seas Are Flooding Virginia's Naval Base, and There's No Plan to Fix It," Inside Climate News, Oct. 25 2017, available at https://insideclimatenews.org/news/10252017/military-norfolk-naval-base-flooding-climate-change-sea-level-global-warming-virginia

[29] Rephann, Terance J., "The Economic Impacts of Agriculture and Forest Industries in Virginia," Weldon Cooper School of Public Service, University of Virginia, Jun. 2013, available at http://www.dof.virginia.gov/infopubs/_outside-pubs/The-Economic-Impact-Of-Agriculture-And-Forestry_2013_outpub.pdf

[30] Pope, C. Arden, "Respiratory Disease Associated with Community Air Pollution and a Steel Mill, Utah Valley," *American Journal of Public Health* 79.5 (1989): 623-628, available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1349506/pdf/amjph00231-0079.pdf

[31] Xiaopeng Lu, Lawrence Lessner, and David O. Carpenter, "Association Between Residential Proximity to Fuel-Fired Power Plants and Hospitalization Rate for Respiratory Diseases," Environmental Health Perspectives 120, no.6 (2012): 807-810.

[32] "Trends in Asthma Morbidity and Mortality," American Lung Association, Sept. 2012, available at http://www.lung.org/assets/documents/research/asthma-trend-report.pdf *[defining child as <1 to 14 years old]*

[33] "Trends in Asthma Morbidity and Mortality," American Lung Association, Sept. 2012, available at http://www.lung.org/assets/documents/research/asthma-trend-report.pdf *[defining child as <1 to 14 years old]*

[34] Centers for Disease Control and Prevention, "Asthma's Impact on the Nation Fact Sheet," available at: https://www.cdc.gov/asthma/impacts_nation/asthmafactsheet.pdf.

[35] Virginia Department of Health, "Asthma Burden in Virginia," available at: http://www.vdh.virginia.gov/content/uploads/sites/94/2016/07/AsthmaBurdenReport.pdf

Nationwide, students with asthma from low-income families miss of days of school due to asthma more frequently than students from wealthier households — and similarly for Black and Hispanic Americans.[36] In Virginia, Black children are reported to have asthma at nearly twice the rate of white children (13.4% vs. 7.6%).[37]

Recent literature also affirms that anthropogenic climate change is already affecting the health of Americans, and will pose even more severe threats without action to dramatically limit GHGs.[38] These impacts are likely to disproportionately impact already vulnerable populations including elderly people, low-income communities, and communities of color that are already facing existing health disparities and inequities.[39] Among the ways climate change threatens human health are by increasing deaths and illnesses from heat;[40] lowering air quality by accelerating the formation of ground-level ozone pollution, increasing fine particle pollution and ozone pollution from wildfires, and making pollen and mold allergy seasons longer and more severe;[41] expanding the geographical range and seasonal timing of tick- and mosquito-borne diseases like Lyme disease and West Nile Virus;[42] and exacerbating water-and food-borne illnesses through rising temperatures, more extreme rainfall, and coastal storm surges.[43]

3. Virginia can unleash clean energy and slash carbon pollution from the power sector.

Virginia is well positioned to be a clean energy leader and usher in a low-carbon future for the state. The Commonwealth has incredible potential for deploying clean resources. Across the country, rapidly falling costs of renewable technologies, shifting consumer and investor preferences for clean energy, favorable policies, and strong commitments from major power companies to cut carbon pollution in order to address climate change are driving a rapid transition to a clean energy economy. In Virginia, accelerated progress deploying clean energy is

[36] Centers for Disease Control and Prevention, "Asthma-related Missed School Days among Children aged 5–17 Years," available at: https://www.cdc.gov/asthma/asthma_stats/missing_days.htm.
[37] Virginia Department of Health, "Asthma Burden in Virginia," available at; http://www.vdh.virginia.gov/content/uploads/sites/94/2016/07/AsthmaBurdenReport.pdf
[38] USGCRP, "The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment," Crimmins, A., J. Balbus, J.L. Gamble, C.B. Beard, J.E. Bell, D. Dodgen, R.J. Eisen, N. Fann, M.D. Hawkins, S.C. Herring, L. Jantarasami, D.M. Mills, S. Saha, M.C. Sarofim, J. Trtanj, and L. Ziska (eds.) (2016) at 26, https://health2016.globalchange.gov/.
[39] Luber, G., K. Knowlton, J. Balbus, H. Frumkin, M. Hayden, J. Hess, M. McGeehin, N. Sheats, L. Backer, C. B. Beard, K. L. Ebi, E. Maibach, R. S. Ostfeld, C. Wiedinmyer, E. Zielinski-Gutiérrez, and L. Ziska, 2014: Ch. 9: Human Health. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 220-256. doi:10.7930/J0PN93H5. 228-229.
[40] USGCRP at 30, 44.
[41] USGCRP at 70.
[42] USGCRP at 70.
[43] USGCRP at 158, 190.

urgently needed — and readily achievable — if the state is to become a true leader on clean energy and climate action.

Virginia has an important role to play in moving toward power sector decarbonization. In 2016, Virginia ranked 21st nationally in terms of CO2 emissions from the power sector (the state ranked 14th for electric generating capacity and 17th for net electric generation in 2016).[44] Across the U.S., carbon emissions from the power sector comprised about 35% of energy-related CO2 emissions in 2016.[45]

A. Virginia has significant opportunity to deploy clean energy resources.

Virginia has tremendous opportunity to accelerate clean energy deployment and expand the role of renewables and energy efficiency in the state. Virginia has an estimated 89,000 MW of onshore and offshore wind capacity potential, which remains largely untapped.[46] If Virginia fully developed its significant wind potential, the Commonwealth could serve an electric load that outstrips the state's own needs.[47] Virginia can also take advantage of tremendous solar capacity potential, estimated at 1,090,000 MW of utility-scale solar potential and 19,000 MW of rooftop solar potential.[48]

Recent progress demonstrates interest and opportunity to expand Virginia's clean energy resources. Jobs in Virginia's solar industry grew 10% from 2016 to 2017,[49] while more than 75,000 Virginians work in energy efficiency. [50] More than 3,600 MW of solar capacity is under development in the state, according to PJM and the Virginia Solar Energy Development and Energy Storage Authority,[51] fueled in part by strong interest from companies committed to clean energy. For example, Microsoft recently announced the company will purchase 315 MW of power from a solar farm currently under construction in Spotsylvania. The Spotsylvania farm will also support several other companies—its capacity fully committed to corporate buyers.

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[44] https://www.eia.gov/electricity/state/virginia/
[45] https://www.eia.gov/tools/faqs/faq.php?id=77&t=11
[46] https://windexchange.energy.gov/maps-data/321
[47] *Calculations based on analysis from the following sources: For wind capacity potential,* "U.S. Installed and Potential Wind Power Capacity and Generation," Wind Energy Technologies Office, U.S. Department of Energy, Q4 2017, available at https://windexchange.energy.gov/maps-data/321; *for wind capacity factors*, https://atb.nrel.gov/electricity/2017/summary.html; *and for Virginia electric load,* https://www.eia.gov/electricity/state/virginia/.
[48] http://www.nrel.gov/docs/fy12osti/51946.pdf
[49] http://www.thesolarfoundation.org/wp-content/uploads/2018/02/Solar-Jobs-By-State-1.pdf
[50] U.S. Department of Energy, "Virginia Energy and Employment," *U.S. Energy and Employment Report*, Jan. 2017, https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%202_0.pdf.
[51] https://rga.lis.virginia.gov/Published/2017/RD563/PDF; https://www.pjm.com/planning/services-requests/interconnection-queues.aspx. Not counting generation that has already entered into service

B. Clear national trends indicate unstoppable momentum toward a low-carbon future powered by clean energy.

Shifts in Virginia's power sector reflect clear national trends towards a low-carbon electricity future. In Virginia, power sector CO2 emissions declined by 24% from 2005 to 2015,[52] while nationwide, power sector CO2 emissions declined by 21% in the same period.[53] EDF analysis has shown that these reductions have been driven by a combination of falling costs of renewable energy, low natural gas prices, changing consumer preferences, and existing policies that incentivize clean energy deployment.[54]

According to M.J. Bradley & Associates, in 2016, U.S. coal generation dropped to its lowest levels since the early 1980s, reaching 30% of total generation compared to 50% of total generation in 2005.[55] For the first time, in 2016, natural gas was the leading source of electricity generation at 34% of total generation.[56] That same year, the U.S. coal fleet operated at 53% utilization rate while natural gas combined cycle plants operated at an average capacity factor of 56%.[57]

Coal-fired units have also continued to retire at a rapid pace. Since 2010, more than 100 GW of U.S. coal capacity has announced plans to retire.[58] As of June 2017, nearly 63 GW of coal capacity has retired.[59] Most of these retiring plants are very old, and aging out of the coal-fleet will continue in the near future.[60] According to the Columbia University Center on Global Energy Policy, increased competition from cheap natural gas has been by far the major contributor to the decline in U.S. coal generation, accounting for 49% of the decline.[61] Reduced

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[52] U.S. EIA, "Virginia Carbon Dioxide Emissions from Fossil Fuel Consumption (1980-2015)," Oct. 24, 2017, available at: https://www.eia.gov/environment/emissions/state/.
[53] http://blogs.edf.org/climate411/files/2017/01/CPP-Combined-3.pdf
[54] *Ibid*.
[55] M.J. Bradley & Associates, *Coal-Fired Electricity Generation in the United States and Future Outlook* (Aug. 2017), Attachment Q.
[56] *Id.*
[57] *Id.*
[58] Since January this year, about 10 large coal plants have announced plans to close. See *Id.* at 1-2.
[59] *Id.*
[60] *See id.* at 4 (On average, units that announced plans to retire between 2010 and 2015 were 57 years old).; *see also* Declaration of Kevin P. Culligan in the D.C. Circuit opposing the CPP stay at 15 (citing aging out as the second factor, after natural gas prices, driving the shift away from coal towards a cleaner resource mix: "In the nearly five years preceding signature of the Rule, the average age of a retiring coal plant was 55 years old."), https://www.edf.org/sites/default/files/content/epas_response_in_opposition_to_motions_to_stay_cpp.pdf.
[61] Houser *et al.*, Columbia University School of International and Public Affairs Center on Global Energy Policy, *Can Coal Make a Comeback?* (Apr. 2017), http://energypolicy.columbia.edu/sites/default/files/Center%20on%20Global%20Energy%20Policy%20Can%20Coal%20Make%20a%20Comeback%20April%202017.pdf; *see also* Hibbard *et al.*, Analysis Group, *Electricity Markets, Reliability and the Evolving U.S. Power System* (June 2017), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/ag_markets_reliability_final_june_2017.pdf; *see also* Chang *et al.*, The Brattle Group, *Advancing Past "Baseload" to a Flexible Grid: How Grid Planners and Power Markets Are Better Defining System Needs to Achieve a Cost-Effective and Reliable Supply Mix*, (June 2017),

demand for electricity and the growth of renewables accounted for 26% and 18% of the reduction in coal generation, respectively.[62]

Meanwhile, renewable energy costs have declined precipitously in recent years. The National Renewable Energy Laboratory reports that the cost of utility-scale solar fell by more than 77% from 2010 to 2017.[63] Worldwide, the cost of solar and onshore wind declined by 18% in the last year alone, according to a study by Bloomberg New Energy Finance.[64] Lazard reports that as of 2017, the lifetime cost of unsubsidized wind and utility-scale solar may now be below that of coal generation, and on par with natural gas combined cycle technology.[65] These and other recent projections are becoming reality in some regions: in Colorado, for example, a recent solicitation for new renewables resulted in bid prices for wind and solar *plus* energy storage that are cheaper than the operating cost of nearly all coal plants in the state.[66]

These improving wind and solar economics, along with federal and state policy support and changing consumer preferences, have continued to drive renewable energy deployment in recent years. Together, wind and solar accounted for 63% of utility-scale capacity additions in 2016.[67] The U.S. solar industry alone added over 10 GW of solar capacity in 2016, a new annual record and double the capacity added in 2015.[68] Wind energy experienced similar record growth and had an installed capacity of more than 80 GW across the U.S. as of 2016.[69]

Recognizing these trends, major electric power companies across the U.S. are committing to deep reductions in CO2 emissions, including American Electric Power (60% reductions by 2030 and 80% by 2050 below 2000 levels),[70] Consumers Energy (80% by 2040),[71] DTE Energy (80% by 2050),[72] Duke Energy (40% by 2030 below 2005 levels),[73] FirstEnergy (90% by 2045 below 2005 levels),[74] and Xcel Energy (60% by 2030 below 2005 levels).[75]

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http://www.brattle.com/system/publications/pdfs/000/005/456/original/Advancing_Past_Baseload_to_a_Flexible_Grid.pdf?1498246224.

[62] *See* Chang et al, *supra* note 108.

[63] https://www.nrel.gov/docs/fy17osti/68925.pdf

[64] https://about.bnef.com/blog/tumbling-costs-wind-solar-batteries-squeezing-fossil-fuels/

[65] https://www.lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf

[66] https://www.carbontracker.org/colorados-renewables-revolution/

[67] Denise A. Grab *et al.*, Institute for Policy Integrity New York University School of Law, *The Falling Cost of Clean Power Plan Compliance* (Oct. 2017).

[68] *Id.*

[69] *Id.*

[70] https://www.aep.com/newsroom/newsreleases/?id=2021

[71] https://old.consumersenergy.com/News.aspx?id=8831&year=2018

[72] https://www.eenews.net/eenewspm/2017/05/16/stories/1060054642

[73] https://www.eenews.net/greenwire/2017/04/27/stories/1060053707

[74] https://firstenergycorp.com/newsroom/news_articles/firstenergy-launches-environmental-campaign-focused-on-a-cleaner.html

[75] http://www.startribune.com/at-xcel-we-ll-stay-on-a-clean-energy-path/428513313/

4. **Virginians strongly support aggressive climate action.**

Alexandria, Arlington, Charlottesville, Fairfax, Falls Church, and Richmond[76], together accounting for over 20% of Virginia's population, have all signed the "We Are Still In" declaration, committing to working towards the climate goals of the Paris Agreement and securing ambitious emission reductions. In addition, vast majorities of Virginians – 84% of Democrats and 79% of Republicans[77] − support enforceable carbon limits on the state's power plants.

5. **EDF strongly supports Virginia finalizing a regulation to reduce carbon pollution from the electric power sector, covering both new and existing sources, in order to mitigate the effects of climate change and grow the clean energy economy in Virginia.**

EDF commends DEQ and the APCB for proposing this action to abate carbon pollution from the electric power sector. By finalizing a strong rule to achieve cost-effective, environmentally protective CO2 emission reductions, Virginia will position itself to truly lead on climate action while securing numerous benefits to public health, Virginia's economy, and the environment. In the following sections, EDF provides recommendations for Virginia to finalize a strong rule to secure meaningful reductions in carbon pollution from the power sector and effectively implement a CO2 trading program that links with the Regional Greenhouse Gas Initiative.

6. **DEQ should set an emissions budget that starts in 2020 at *no higher* than 30 million tons and declines annually by *at least* 3% of the 2020 budget – and should seriously consider a budget that starts even lower and declines more stringently over time, particularly as new information and analysis becomes available about Virginia emissions. DEQ should also evaluate adjustment approaches to ensure the budget is properly calibrated.**

DEQ should finalize an emissions budget that starts at or below expected emissions under business-as-usual (BAU) in 2020. Modeling results and real-world trends suggest that power sector CO2 emissions in 2020 under BAU are likely to be well below DEQ's earlier projections.

[76] "We Are Still In Declaration," We Are Still In, 2018, available at https://www.wearestillin.com/we-are-still-declaration

[77] "Bipartisan Poll: Virginians Embrace Clean Energy and Climate Action," National Resources Defense Council, Feb. 3 2015, press release, available at https://www.nrdc.org/media/2015/150203-0

Accordingly, 30 million short tons should constitute the *upper bound* for the starting budget in 2020 — with strong evidence indicating DEQ should seriously consider setting a budget that starts even lower.

In addition, DEQ should set a budget that declines annually by a tonnage amount of *at least* 3% of the 2020 budget — which is in alignment with the existing RGGI program – and strongly consider a more stringent rate of decline, taking into account the importance of putting the state and the region on a trajectory to zero power sector CO2 emissions by mid-century.

Recognizing that the ability to accurately predict future emissions based on current data has limitations, EDF also recommends DEQ provide for a mechanism to adjust the base budget in 2020 or 2021 if actual emissions are lower than projected.

A. The 2020 base budget should be set at or below expected emissions under BAU, in order to maximize environmental benefits.

In order to maximize benefits of the CO2 Budget Trading Program, Virginia should take steps to set a budget that starts in 2020 at or below emissions that would have occurred under a business-as-usual (BAU) scenario. This is crucial in order for the program to drive meaningful additional CO2 reductions beyond BAU, as well as greater near-term emission reductions in the early years of the program, enabling more cost-effective reduction pathways and opening the door to achieving higher levels of mitigation over the long-term (as outlined in Section 6.C.ii below).

It is worth emphasizing that a starting base budget can also be lower than expected emissions under BAU, since covered facilities will have time to plan ahead for compliance with the regulation once finalized – and in fact, have already had time to anticipate the program and general direction of the regulatory framework given the policy direction outlined in the May 2017 Executive Directive 11 and the ongoing rulemaking process.[78] Moreover, as discussed in Section 3 above, cost-effective abatement opportunities in the power sector are readily available.

B. Recent modeling and real-world trends indicate Virginia power sector emissions in 2020 under BAU could be well below DEQ's earlier projections, suggesting DEQ should set a starting cap *no higher* than 30 million tons in 2020.

Recent modeling suggests that Virginia power sector CO2 emissions under BAU in 2020 could be as low as 24 million short tons.

[78] Governor of Virginia, Executive Directive 11, *Reducing Carbon Dioxide Emissions from Electric Power Facilities and Growing Virginia's Clean Energy Economy*, May 16, 2017, *available at* https://governor.virginia.gov/media/9155/ed-11-reducing-carbon-dioxide-emissions-from-electric-power-facilities-and-growing-virginias-clean-energy-economy.pdf.

- In 2017, DEQ projected Virginia power sector emissions would be 33-34 million short tons in 2020, using the Integrated Planning Model (IPM) and assumptions from Annual Energy Outlook (AEO) 2017, Dominion's 2017 Integrated Resource Plan, and the RGGI 2016-2017 Program Review.[79]
- The Natural Resources Defense Council (NRDC) in 2017 projected BAU emissions would be 32.8 million tons in 2020, using assumptions from AEO 2017.[80]
- However, more recent modeling conducted for NRDC in 2018 used updated assumptions from AEO 2018 to project BAU emissions of 28 million tons in 2020 — roughly 5 million tons lower than NRDC's previous-year projections.[81]
- Meanwhile, The Rhodium Group in 2017 projected BAU emissions well below DEQ's forecast — as low as 24-25 million tons in 2020, with cumulative emissions of 247-277 tons of CO2 in 2020-2030, using a modified version of the National Energy Modeling System (NEMS).[82]

These additional modeling efforts suggest DEQ's original projections of 2020 BAU emissions are likely to be overestimates. Furthermore, as new data becomes available, projections of 2020 BAU emissions could be expected to decline further.

Recent announcements of fossil fuel deactivations, as well as new developments for renewable energy and energy efficiency, further indicate the power sector is becoming cleaner — and demonstrate a rapid pace of change toward a lower-carbon electric sector in Virginia that is challenging for modeling efforts to fully capture. Clear trends toward a cleaner power sector in Virginia reflect an ongoing transformation across the country toward a low-carbon future for the U.S. electric power sector, as we discuss in Section 3 above.

- With recent announcements as of April 3, 2018, 1,721 MW of coal and natural gas generating capacity is now slated for deactivation by March 2019, according to PJM data.[83] In 2016, these units emitted 3.87 million tons of CO2. In 2017, the units emitted 1.71 million tons.[84]
- Meanwhile, recent developments suggest a promising future for zero-emitting solar and wind generation that could reduce Virginia emissions by displacing fossil fuel generation. As of April 3, 2018, a total of 3,621 MW of solar capacity in the PJM interconnection

[79] DEQ modeling
[80] "NRDC Comments on VA DEQ's Proposed Carbon Regulation, 7/26/2017," *available at* http://www.deq.virginia.gov/Programs/Air/GreenhouseGasPlan/AdditionalComments.aspx.
[81] "NRDC Comments on VA DEQ's Proposed Carbon Regulation," submitted to Virginia docket 9 VAC 5-140, April 9, 2018.
[82] https://rhg.com/research/rggi-expansion-road-ahead/ & Rhodium's U.S. Climate Serviceclimate service
[83] http://www.pjm.com/planning/services-requests/gen-deactivations.aspx
[84] EIA Form 860M, Jan. 2018; EPA Air Markets Program Data.

queue is expected to enter into service by the end of 2019.[85] The Virginia Solar Energy Development and Energy Storage Authority reported that as of November 2017, 2,703 MW of solar was under development in Virginia.[86] In March 2018, new energy legislation in Virginia declared 5,000 MW of new solar capacity and 16 MW of offshore wind capacity to be "in the public interest."[87]

- The new energy legislation also paves the way for Virginia to deploy more cost-effective energy efficiency, which, by reducing demand for electricity in the state, can contribute to avoiding carbon dioxide emissions that would have been emitted in the absence of energy efficiency savings. The legislation requires Virginia's two largest utilities to spend at least $1.01 billion in aggregate, over ten years from 2018 to 2028, on energy efficiency.[88]

These trends and data combined with recent modeling indicates that 2020 BAU emissions are very likely to be lower than DEQ initially estimated and could continue to decline between now and the beginning of the program. EDF recommends that DEQ set a base budget that starts *no higher* than 30 million tons in 2020, but strongly encourages DEQ to carefully consider compelling evidence from recent modeling and power sector trends that supports the setting of a base budget that starts below this upper bound.

C. By setting a lower starting budget, DEQ can unlock additional benefits of a more environmentally protective program.

In addition to available data suggesting a base budget starting at or below 30 million short tons in 2020 could be appropriate to reflect actual emissions, a lower starting budget can also help facilitate additional benefits that can result from a more environmentally protective program. In particular, a base budget that starts below a 30 million ton upper bound would be consistent with a trajectory for Virginia to reach zero carbon emissions from the power sector by mid-century. A lower budget would also help Virginia drive additional near-term emission reductions, unlocking the benefits of taking earlier actions to mitigate climate change.

i. In order to effectively mitigate climate change, Virginia should chart a path consistent with a trajectory to achieve zero CO2 emissions from the power sector by mid-century.

With annual average temperatures in the U.S. having increased by approximately 1.0°C in the last 115 years, the impacts of climate change are already becoming apparent.[89] Increased

[85] https://www.pjm.com/planning/services-requests/interconnection-queues.aspx. Not counting generation that has already entered into service
[86] https://rga.lis.virginia.gov/Published/2017/RD563/PDF
[87] https://lis.virginia.gov/cgi-bin/legp604.exe?181+sum+HB1558
[88] https://lis.virginia.gov/cgi-bin/legp604.exe?181+sum+HB1558
[89] https://science2017.globalchange.gov/chapter/executive-summary/

magnitudes of temperature rise are likely to further increase the prevalence of harmful climate changes worldwide, including severe weather events, extreme temperatures, extreme precipitation changes leading to droughts and flooding, and impacts to natural ecosystems and human necessities such as food security.[90] As global average temperatures continue to increase, the risk of triggering "tipping points" — abrupt, irreversible changes to the climate system that could lead to catastrophic impacts[91] — also increases.[92] A number of studies have modeled the possible impacts of climate change under global warming scenarios of 1.5°C and 2°C above pre-industrial levels, concluding that the severity of impacts is reduced with lower levels of global temperature rise.[93] Indeed, the Paris Agreement signed in 2015 lays out a global goal of "Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."[94]

A number of recent studies suggest that in order to limit global temperature increases to less than 1.5°C or 2°C above pre-industrial levels, global carbon dioxide emissions must reach net-zero by mid-century. Rockström, *et. al.*, lay out a global "decarbonization" roadmap towards net-zero CO2 emissions by 2050, which translates to a 50% probability of limiting warming to 1.5°C by 2100 and >66% chance of limiting warming to 2°C.[95] Rogelj, *et. al.*, model scenarios to limit warming to below 1.5°C or 2°C by 2100 that imply reaching net-zero CO2 emissions between 2045-2070.[96] Walsh, *et. al.*, use the FeliX model to find that global CO2 emissions reach net-zero by 2040-2050 in order to limit warming to below 1.5°C or 2°C.[97]

In addition, studies show that in order to achieve deep CO2 reductions in the U.S. by mid-century, the electric power sector specifically must decarbonize — dramatically reducing carbon intensity and therefore emissions from the electric system — while other sectors switch fuels from high-carbon sources to low- or zero-emitting sources, primarily low-carbon electricity.[98] Further, given cost-effective opportunities to reduce carbon emissions in the electric sector, and the lower overall emissions that can result from securing power sector decarbonization in advance of other sectors switching to electricity, it makes sense that the electric power sector should do more than its proportional share in reducing emissions, and follow a steeper trajectory to achieve zero CO2 emissions earlier in time than other sectors.

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[90] https://science2017.globalchange.gov/chapter/executive-summary/
[91] http://www.pnas.org/content/105/6/1786
[92] https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf page 14
[93] https://www.earth-syst-dynam.net/7/327/2016/esd-7-327-2016-discussion.html (global);
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0168697 (continental US)
[94] http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf
[95] http://science.sciencemag.org/content/355/6331/1269.full
[96] https://www.nature.com/articles/nclimate2572
[97] https://www.nature.com/articles/ncomms14856
[98] http://www.usddpp.org/downloads/2014-technical-report.pdf (page 22);
https://www.nrel.gov/docs/fy17osti/68214.pdf

In order to assess whether Virginia's emissions budget is consistent with a trajectory to zero CO2 emissions from the power sector by mid-century, DEQ can evaluate historical emissions data from 2016 and 2017.[99] Using this data as one set of possible benchmarks, a straight-line decline from 2016 or 2017 emissions to zero by 2050 is consistent with 2020 emissions of 29-30 million short tons or less, supporting a base budget that starts below 30 million short tons in 2020.

ii. Virginia should strive to achieve greater near-term emission reductions, recognizing the benefits of taking early action to address climate change.

The Fourth National Climate Assessment— a peer-reviewed assessment of the science of climate change in the United States — finds, "Net cumulative CO_2 emissions in the industrial era will largely determine long-term, global mean temperature change. A robust feature of model climate change simulations is a nearly linear relationship between cumulative CO_2 emissions and global mean temperature increases. … Increasing the probability that any given temperature goal will be reached therefore implies tighter constraints on cumulative CO_2 emissions. Relatedly, for any given cumulative CO_2 budget, higher emissions in the near term imply the need for steeper reductions in the long term."[100] Conclusions of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change agree, finding that "Cumulative total emissions of CO2 and global mean surface temperature response are approximately linearly related. Any given level of warming is associated with a range of cumulative CO2 emissions, and therefore, e.g., higher emissions in earlier decades imply lower emissions later."[101]

Furthermore, a number of studies find that the timing of efforts to reduce CO2 emissions can significantly impact the economic and environmental costs of action. Delayed action — meaning CO2 emissions remain at high levels in the near-term, over a span of years to decades — requires significantly accelerated mitigation efforts in later years to achieve the same cumulative emissions goals (and by correlation, global warming targets). Studies show that delaying mitigation efforts can substantially increase the economic costs of necessarily more ambitious mitigation in the future. Delayed action also increases the risk of overshooting cumulative emission targets, increasing the likelihood of global temperatures rising beyond the 1.5°C or 2°C target.[102] Conversely, prioritizing emission reductions today can enable long-term

[99] https://www.rggi.org/sites/default/files/Uploads/Participation/2018-01-26-Meeting/VA_Presentation_2018_01_26.pdf (2016 emissions); EPA Continuous Emissions Modeling System (2017 emissions).
[100] https://science2017.globalchange.gov/chapter/14/
[101] https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf
[102] *See* Valentina Bosetti, *et. al.*, "Delayed action and uncertain stabilisation targets. How much will the delay cost?" *Climatic Change* **96** (2009): 299-312. *See also* Volker Krey and Keywan Riahi, "Implications of delayed participation and technology failure for the feasibility, costs, and likelihood of staying below temperature targets—Greenhouse gas mitigation scenarios for the 21st century," *Energy Economics* **31** (2009): S94-S106. *See also* Naomi E. Vaughan, *et. al.*, "Climate change mitigation: trade-offs between delay and strength of action required," *Climatic Change* **96** (2009): 29-43.

mitigation to be more economically cost-effective and increase the likelihood of keeping global temperature increases below target limits.

By setting a lower 2020 starting budget, Virginia can facilitate long-term economic and environmental benefits of prioritizing early emission reductions and further limit cumulative CO2 emissions from the power sector.

D. DEQ should set an emissions budget that declines each year by an amount *at least* equivalent to 3% of the 2020 budget.

The RGGI states have determined a regional cap for 2021-2030 that declines by 2.275 million tons per year after 2021 — approximately 3% of the 2021 cap — resulting in a 30% reduction in the cap from 2020 to 2030. Virginia should achieve *at least* a similar level of reductions as it contemplates linkage with RGGI. Furthermore, Executive Directive 11 directs DEQ to create a rule to reduce CO2 from the power sector that provides for a "corresponding level of stringency" with CO2 limits in other states.

DEQ should also consider a steeper decline, considering the benefits of prioritizing near-term reductions and of maintaining consistency with a trajectory to zero emissions by mid-century, as discussed above. For example, a pathway to zero emissions by 2040 could imply a yearly decline equivalent to 5% of the 2020 budget, while a path to zero emissions by 2050 could imply a yearly decline equivalent to 3.3% of the 2020 budget. A steeper rate of decline at the program outset, even while retaining a lower rate of decline in later years, would also facilitate further limits on cumulative emission reductions and additional near-term reductions.

E. DEQ should provide for an adjustment mechanism to enhance environmental protectiveness of the emissions budget if actual emissions are lower than projected.

While energy and economic models provide important insights into likely trends and future outcomes, they are not crystal balls and are only as good as the assumptions built into them. Further, particularly in the power sector, underlying market dynamics are changing rapidly, making it challenging for models to keep up. These tools are the best we have to inform our thinking, but it is important to recognize that they have limitations – which is one reason that it is crucial for policy to have the ability to adapt and evolve over time as new information becomes available and as market dynamics change.

Accordingly, EDF recommends DEQ provide for a mechanism to adjust the emissions budget as new data and analysis emerges over time. An adjustment could be made to lower the emissions budget in order to achieve additional emission reductions if abatement opportunities are more readily achievable and cost-effective than forecasts show, as well as to optimize market function. DEQ could establish a mechanism to automatically adjust the emissions budget if certain conditions are triggered, or provide for a manual adjustment early in the program.

An automatic adjustment mechanism could use a pre-determined formula to tighten the emissions budget under certain conditions. DEQ could establish such a mechanism to adjust the base budget in early years of the program if actual emissions are lower than projected – not unlike how RGGI has adjusted its cap in the past to account for banked allowances.

DEQ has a range of options for the timing of any such adjustment, and should consider factors such as the availability of new emissions data, ease of administration, and the timing of RGGI auctions, compliance periods, and the 2021 bank adjustment.

Alternatively, DEQ could provide for a manual adjustment of the emissions budget when new data becomes available — for example, 2019 or 2020 actual emissions from the affected power sector units.

7. Virginia should link and align the CO2 Budget Trading Program with the Regional Greenhouse Gas Initiative, in order to facilitate cost-effective emission reductions.

EDF supports Virginia linking to the Regional Greenhouse Gas Initiative (RGGI) and aligning its proposed rule accordingly. An expanded regional carbon trading market in which Virginia links with the existing RGGI program has a number of benefits, including greater liquidity, streamlined administration, and additional opportunities for cost-effective compliance.[103]

The benefits of cost-effective CO2 emission reductions from a well-designed CO2 trading program are clear. For example, research from Analysis Group on the effects of the Regional Greenhouse Gas Initiative (RGGI) found that from 2012-2014 alone, RGGI added $1.3 billion in economic value in the nine-state region and led to the creation of more than 14,000 jobs.[104] Analysis by Abt Associates concluded that from 2009-2014, RGGI contributed to at least $5.7 billion in health savings and other benefits, 39,000 lost work days averted, and 300-830 lives saved.[105] By finalizing a strong CO2 Budget Trading Program that links with RGGI, Virginia is poised to garner significant economic, public health, and environmental benefits as well.

A. EDF strongly supports the use of an Emissions Containment Reserve.

RGGI's 2017 Model Rule employs an Emissions Containment Reserve (ECR), which will allow withholdings of additional allowances from the auction to ensure additional emission

[103] https://openknowledge.worldbank.org/bitstream/handle/10986/23874/ETP.pdf?sequence=11&isAllowed=y
[104] http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf
[105] http://abtassociates.com/getattachment/Reports/2017/RGGI/RGGI-Public-Health-Impacts_final4.pdf.aspx

reductions if emission reduction costs are lower than expected.[106] The ECR is an innovative and valuable design element that can help the RGGI region leverage opportunities for strengthening the program and achieving additional emission reductions if compliance or abatement costs are lower than anticipated.[107] Virginia has appropriately included the elements of the ECR and withholding of allowances in its proposed rule in alignment with RGGI's Model Rule.

B. DEQ should harmonize the minimum reserve price in Virginia with the reserve price in the existing RGGI states.

DEQ should harmonize the minimum reserve price for the Virginia CO2 Budget Trading Program with the minimum reserve price in RGGI. As noted by Resources for the Future, "[a] price floor is generally considered an important feature of good auction design."[108] Indeed, the price floor has played a crucial role in the success of the RGGI program. DEQ should revise the minimum reserve price in its proposal to align with the RGGI reserve price for 2020, consistent with the 2017 Model Rule, and escalating at a harmonized level.

C. DEQ should participate in the periodic RGGI Program Reviews, and lay the groundwork for further carbon pollution reductions post-2030.

There is a continued need for emission reductions beyond 2030 to achieve U.S. climate goals and protect Virginians from the impacts of carbon pollution. DEQ should participate in any RGGI program reviews that occur, working to chart out a path for post-2030 reductions that put Virginia and the RGGI region on a trajectory towards zero emissions by mid-century. Periodic program reviews are an important mechanism for Virginia and other states to assess the success of the program and make necessary changes to strengthen the program, ensuring it continues to facilitate cost-effective emission reductions with the appropriate level of protectiveness, such as tightening the emissions budget. It is important for DEQ to provide as much long-term certainty around carbon regulation as possible for regulated facilities and others doing business in Virginia – this market certainty will contribute to a successful and robust emissions market, and can also help ensure Virginia is at the table as a leader on climate policy in the future.

8. <u>EDF supports the use of a consignment auction with updating output-based allocation to covered sources.</u>

In lieu of a full auction, EDF supports DEQ's proposed approach to allocate allowances to covered sources with an updating output-based approach, and to require sources to consign

[106] Regional Greenhouse Gas Initiative, Model Rule, CO2 Budget Trading Program General Provisions. 2017.
[107] http://www.rff.org/files/document/file/RFF-Rpt-RGGI_ECR.pdf
[108] Resources for the Future, "Fixing Emissions Trading Imbalances with a Price Floor," March 7, 2014. Available at: http://www.rff.org/blog/2014/fixing-emissions-trading-imbalances-price-floor

their allowances to the RGGI auction. This design smooths integration with RGGI, facilitates transparency and market efficiencies, and aids leakage mitigation.

A. EDF supports the proposed consignment auction approach.

EDF supports DEQ's proposal to use a consignment auction approach in allocating CO2 allowances to covered sources. Consignment auctions are a proven method to facilitate transparency and price discovery, as research conducted by Resources for the Future (RFF) concludes:

> "Consignment auctions ensure that all of the allowances enter the market instead of solely being used directly for compliance. They also bring all firms into the market in its early stages instead of allowing them to bank allowances, potentially not engaging in a market transaction for years. In doing so, they catalyze early and salient price discovery and market liquidity. The ease and transparency of the price discovery process enables cap-and-trade programs with free allocation to capture some of the benefits of an auction-based mechanism of allowance distribution."[109]

Consignment auctions have been successfully utilized in existing programs, including the federal Acid Rain SO2 Trading Program and California's Cap-and-Trade Program for greenhouse gases.[110] A consignment auction approach in Virginia should be able to integrate seamlessly with the RGGI auction and key design elements including the price floor and ECR. RFF writes, "The auction outcome does not depend on whether the sold allowances are submitted by a state or if they are submitted by a compliance entity through consignment. … The consigned allowances will be indistinguishable from state-held allowances in the auction, and the effect of these elements of the auction implementation will affect all the allowances in the same way."[111]

Consignment auctions can create further incentives to reduce electric sector carbon emissions through a carbon price signal reflected in electricity rates. Furthermore, measures can be taken to provide benefits to ratepayers alongside a carbon price signal. In California, for example, revenues from allowances allocated to electric utilities for consignment are returned to ratepayers via a "climate credit" utility bill line item, resulting in net positive benefits for low-income ratepayers.

[109] http://www.rff.org/files/document/file/RFF-DP-16-20.pdf
[110] Ibid.
[111] https://www.rggi.org/sites/default/files/Uploads/Participation/2018-01-26-Meeting/Comments/Burtraw_RFF_Comments.pdf

B. EDF supports DEQ's proposal to allocate conditional allowances with an updating output-based approach as an effective means of mitigating emissions leakage.

EDF supports DEQ's proposal to use an updating output-based approach to allocating conditional allowances to covered sources. Analyses conducted by EDF and RFF in the context of the federal Clean Power Plan (CPP) found that using an updating output-based approach can be an effective means of mitigating emissions leakage — wherein carbon emissions shift out-of-state or to sources not covered by the program through, *e.g.*, shifting generation. Modeling conducted by RFF found that using an updating approach to allocate 100% of allowances to a subset of eligible sources under the CPP (as opposed to a historic, or "grandfathering," approach) could reduce leakage by up to 64% compared to a mechanism that allocated only 5% of allowances with an updating output-based approach.[112] Similarly, EDF analysis found that allocating all or nearly all CO2 allowances with an updating output-based approach could significantly reduce leakage compared to alternative approaches.[113]

EDF encourages Virginia and other RGGI participating states to monitor and evaluate whether and to what extent emissions leakage might be occurring on an ongoing basis — and evaluate additional opportunities to effectively mitigate any leakage that may occur.

9. <u>DEQ should expand the program to cover industrial power plants over 25 MW in Virginia.</u>

Industrial power plants over 25 MW in size are a source of carbon pollution in the Commonwealth that DEQ has proposed to exempt from the program. Much of the literature on carbon market designs suggests that broader inclusion of sources (and sectors) can lead to more cost-effective and efficient outcomes.[114] One such analysis states:

> "Generally, broader system coverage is desirable as it increases the range of low-cost mitigation options, allowing emissions reductions to be achieved at the least cost. Broader coverage also reduces competitive distortions, as competing firms and sectors operate within the same market rules, which enhances market liquidity."[115]

Industrial power plant sources may be included in future climate policies and Virginia can help provide regulatory certainty to these facilities by bringing them into the program and

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[112] https://www.edf.org/sites/default/files/content/edf_fp-mr_comments_final_draft.pdf; http://www.rff.org/files/RFF-CPP-Technical-Background.pdf;
[113] https://www.edf.org/sites/default/files/content/edf_fp-mr_comments_final_draft.pdf
[114] For example, see: Resources for the Future, *Carbon Markets: Past, Present, and Future*, December 2012, available at http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-12-51.pdf
[115] Partnership for Market Readiness (PMR) and International Carbon Action Partnership (ICAP). 2016. Emissions Trading in Practice: a Handbook on Design and Implementation. World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO

drive investments to reduce emissions now. It is clear that in order to meet our climate goals, more emitters will need to reduce emissions. There are extensive, cost-effective opportunities for improving efficiency and increasing renewable energy use across industrial sources and DEQ should include these sources in the program.

10. Virginia should take steps to ensure environmental justice concerns are met in the final rule and throughout implementation.

A strong CO2 Budget Trading Program that leads to meaningful reductions in carbon pollution from Virginia's power plants can provide important benefits for communities overburdened by pollution in Virginia and elsewhere. Without affecting timely finalization of the rule, DEQ should conduct ongoing analysis and monitoring to ensure communities disproportionately impacted by air pollution benefit from efforts to abate carbon pollution in Virginia. This analysis could include a geospatial environmental justice screen using demographic and environmental indicators to identify disadvantaged communities that may be disproportionately impacted by eligible and other sources.[116] DEQ should continue to work with affected communities and other stakeholders, such as the Governor's Environmental Justice Advisory Council, to identify any instances of adverse economic or pollution impacts on disadvantaged communities and take appropriate action to mitigate the effects.

DEQ should also continue to engage meaningfully with environmental justice stakeholders and disadvantaged communities as the agency works to finalize this rule and implement the CO2 Budget Trading Program. EDF commends DEQ for its efforts to date to hold public hearings across Virginia and invite deep engagement from diverse stakeholders, and encourage DEQ to continue this practice. Engaging with communities that may be most heavily affected by the program is essential to promoting environmentally and socially just outcomes.

[116] For examples, see: (1) The Environmental Protection Agency's EJSCREEN tool, *available at https://www.epa.gov/ejscreen*; (2) California's CalEnviroScreen, *available at https://oehha.ca.gov/calenviroscreen*; (3) The preliminary report and documentation for an environmental justice analysis conducted on behalf of Kentuckians for the Commonwealth, *available at https://kftc.org/resources/kftc-environmental-justice-analysis-preliminary-report-and-documentation*; and (4) EPA's *EJ Screening Report for the Clean Power Plan*, 2015, *available at https://archive.epa.gov/epa/cleanpowerplan/ej-screening-report-clean-power-plan.html*.